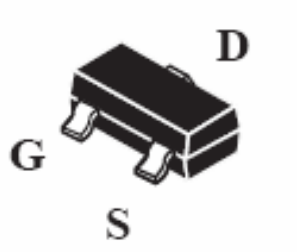
Enhancement Mode MOSFET (N-Channel)



SOT-23

HALOGEN FREE

RoHS Compliant

Features

- High density cell design for low $R_{DS(ON)}$
- Voltage controlled small signal switch
- Rugged and reliable
- High saturation current capability
- RoHS Compliance

Mechanical Data

Case:	SOT-23, Plastic Package
Terminals:	Solderable per MIL-STD-202G, Method 208
Weight:	0.008 gram

Maximum Ratings *(T Ambient=25ºC unless noted otherwise)*

Symbol	Description	2N7002	Unit	Conditions
V_{DSS}	Drain-Source Voltage	60	V	
V_{DGR}	Drain-Gate Voltage (R_{GS}≤1MΩ)	60	V	
V_{GSS}	Gate-Source Voltage Continuous	±20	V	
V_{GSM}	Gate-Source Voltage Non-repetitive (tp≤50μS)	±40	V	
I_D	Drain Current Continuous (Note 1)	115	mA	T_C=25 ˚C
		75	mA	T_C=100 ˚C
I_{DM}	Drain Current Pulsed (Note 2)	800	mA	
P_D	Total Device Dissipation FR-5 Board (Note 3)	225	mW	T_A=25 ˚C
		1.8	mW/° C	Derate above 25 ˚C
R_{thJA}	Max. Thermal Resistance, Junction to Ambient	556	° C/W	
P_D	Total Device Dissipation Alumina Substrate (Note 4)	300	mW	T_A=25 ˚C
		2.4	mW/° C	Derate above 25 ˚C
R_{thJA}	Max. Thermal Resistance, Junction to Ambient	417	° C/W	
T_J	Junction Temperature	-55 to +150	° C	
T_{STG}	Storage Temperature Range	-55 to +150	° C	

Note: 1. The Power Dissipation of thepackage may result in a lower continuous drain current.

2. PulseTest: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%.
3. FR-5=1.0 x 0.75 x 0.062 in.
4. Alumina=0.4 x 0.3 x 0.025 in 99.5% alumina.

Electrical Characteristics *($T_{Ambient}$=25ºC unless noted otherwise)*

Off Characteristics

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	60	-	-	V	V_{GS}=0V, I_D=10μA
I_{DSS}	Zero Gate Voltage Drain Current	-	-	1	μA	V_{DS}=60V, V_{GS}=0V
		-	-	500		V_{DS}=60V, V_{GS}=0V, T_J=125 ˚C
I_{GSSF}	Gate-Body Leakage, Forward	-	-	0.1		V_{DS}=0V, V_{GS}=20V
I_{GSSR}	Gate-Body Leakage, Reverse	-	-	-0.1		V_{DS}=0V, V_{GS}=-20V

On Characteristics *(Note 5)*

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
$V_{GS(th)}$	Gate Threshold Voltage	1.0	1.6	2.0	V	V_{DS}=V_{GS}, I_D=250μA
$R_{DS(ON)}$	Drain-Source ON Resistance	-	1.4	7.5	Ω	V_{GS}=10V, I_D=500mA
		-	1.7	13.5		V_{GS}=10V, I_D=500mA, T_J=125 ˚C
		-	1.8	7.5		V_{GS}=5V, I_D=50mA
		-	2.4	13.5		V_{GS}=5V, I_D=50mA, T_J=125 ˚C
$V_{DS(ON)}$	Drain-Source ON Voltage	-	0.6	3.75	V	V_{GS}=10V, I_D=500mA
		-	0.09	0.375		V_{GS}=5V, I_D=50mA
$I_{D(ON)}$	On State Drain Current	500	2700	-	mA	V_{GS}=10V, V_{DS}≥2$V_{DS(ON)}$
g_{FS}	Forward Transconductance	80	320	-	mS	V_{DS}≥2$V_{DS(ON)}$, I_D=200mA

Dynamic Characteristics *(T Ambient=25ºC unless noted otherwise)*

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
Ciss	Input Capacitance	-	17	50	pF	VDS=25V, VGS=0V, f=1MHz
Crss	Reverse Transfer Capacitance	-	2.5	5.0		
Coss	Output Capacitance	-	10	25		

Switching Characteristics *(T Ambient=25ºC unless noted otherwise)*

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
ton	Turn-On Delay Time	-	7	20	nS	VDD=25V, RL=50Ω ID=500mA, VGS=10V, RG=25Ω
toff	Turn-Off Delay Time	-	11	40		

Drain-Source Diode Ratings and Maximum Ratings

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
ID	Continuous Drain-Source Diode Forward Current	-	-	115	mA	
IDM	Pulsed Drain-Source Diode Forward Current	-	-	800	mA	
VSD	Source-Drain Forward Voltage	-	0.88	1.5	V	VGS=0V, ID=115mA

Note: 5. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

Typical Characteristics Curves

Fig.1- Ohmic Region

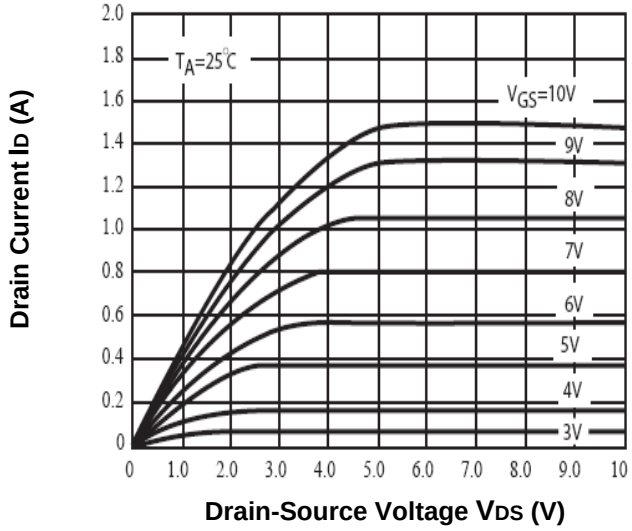


Fig.2- Transfer Characteristics

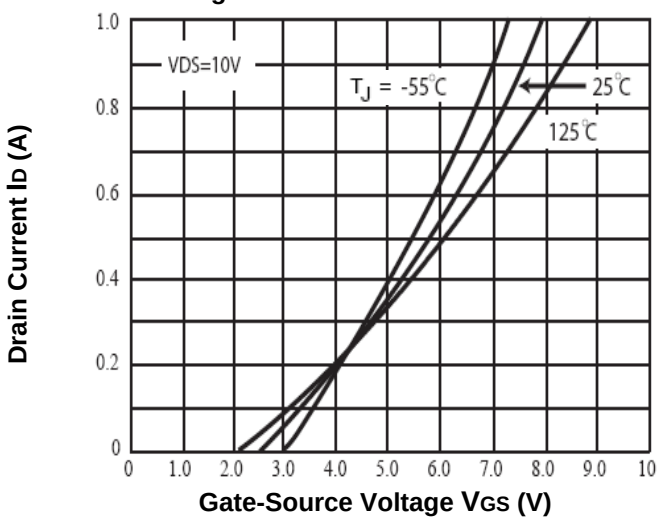


Fig.3- Temperature vs. Static Drain-Source On-Resistance

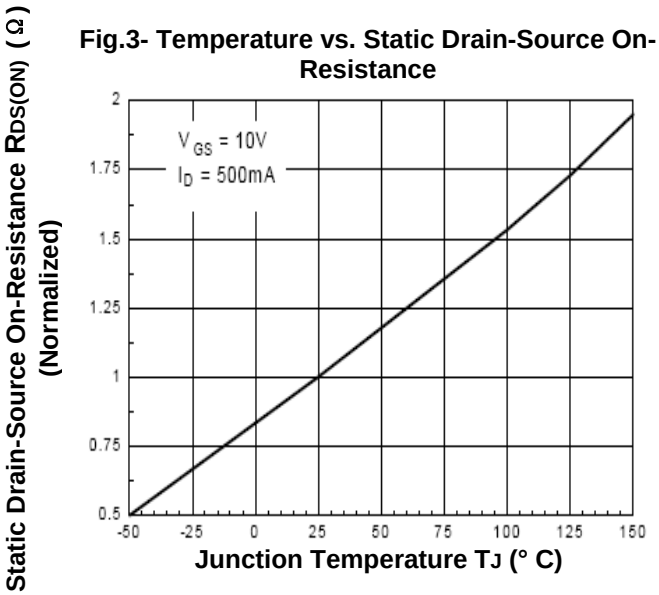
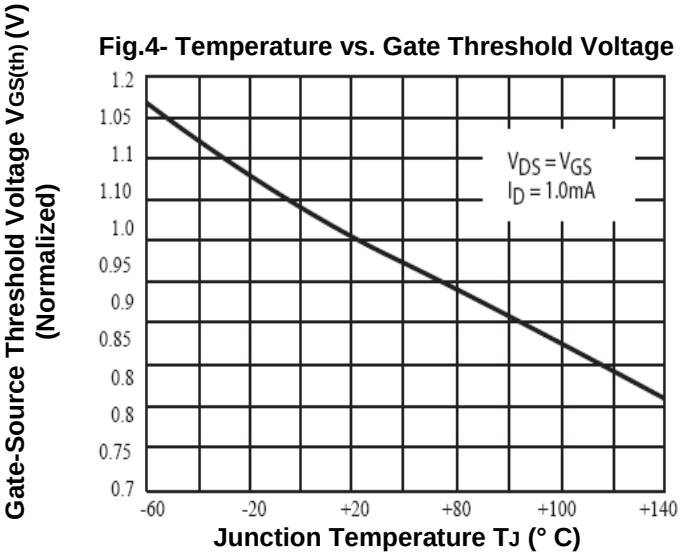
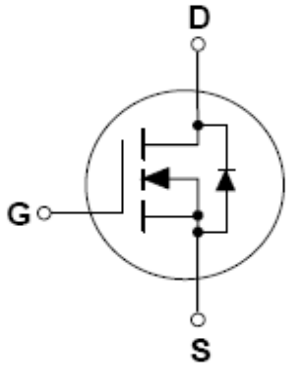


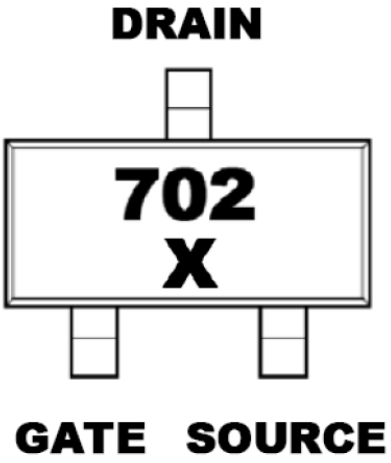
Fig.4- Temperature vs. Gate Threshold Voltage



Equivalent Circuit



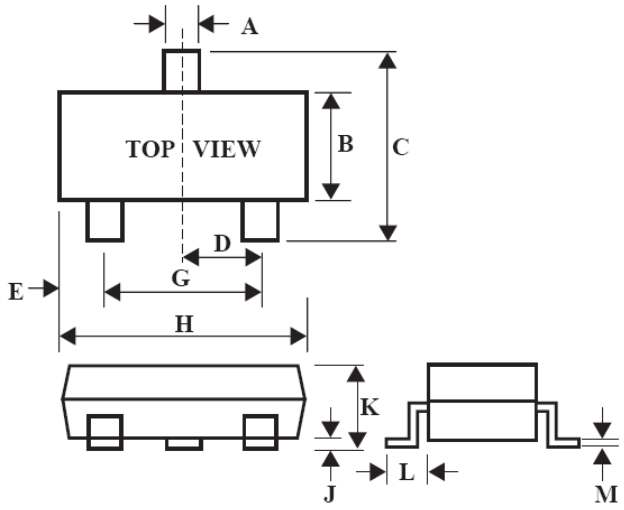
Marking Information:



X: Date Code

2N7002

Dimensions in mm



SOT-23		
Dim	Min	Max
A	0.35	0.51
B	1.19	1.40
C	2.10	3.00
D	0.85	1.05
E	0.46	1.00
G	1.70	2.10
H	2.70	3.10
J	0.01	0.13
K	0.89	1.10
L	0.30	0.61
M	0.076	0.25

SOT-23

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